The Effect of Zumba Dance on Body Mass Index and Flexibility in Women

Somesha S[1] Arpitha D B[2]
[1]*Second Year MPED Department of physical education Kuvempu university jnanashaydrei shankarghatta shivmogga Karnataka university*

***Abstract*—This study aimed to evaluate the impact of an 8-week Zumba dance program on Body Mass Index (BMI) and flexibility among young women aged 21 to 25 years. A total of 40 female postgraduate students from Kuvempu University, Shankaraghatta, were randomly assigned to an experimental group (n = 20) and a control group (n = 20). The experimental group participated in supervised Zumba sessions five days per week, while the control group maintained their usual routines without structured exercise. Pre- and post-test assessments were conducted using standardized methods to measure BMI and flexibility.**

The results showed that BMI remained stable in the experimental group, with no significant change observed ($p>0.05p > 0.05p>0.05$), whereas the control group exhibited a significant reduction in BMI ($p<0.05p < 0.05p<0.05$). Flexibility improved significantly in the experimental group compared to the control group, as evidenced by both paired sample and independent t-tests ($p<0.05p < 0.05p<0.05$). These findings highlight the effectiveness of Zumba in enhancing flexibility but suggest limited impact on BMI over the 8-week intervention period.

In conclusion, Zumba dance can be an effective intervention for improving flexibility and overall physical fitness among young women. However, its influence on BMI may require longer intervention durations or additional complementary strategies. Future research should explore the long-term effects of Zumba on various fitness and health parameters, including cardiovascular fitness and mental well-being, with larger and more diverse populations. This study underscores the potential of Zumba-based programs in promoting fitness and flexibility in young women.

***Index Terms*—Zumba, Body Mass Index, Flexibility,**

I. INTRODUCTION

Zumba, a Latin-inspired dance fitness program, has revolutionized the fitness industry with its unique combination of dance movements, aerobic exercises, and interval training set to vibrant, energetic music. Developed by Alberto "Beto" Perez in the 1990s, Zumba has gained immense popularity as an enjoyable and effective exercise regimen, particularly among women. Its appeal lies in its ability to integrate fun with fitness, providing a non-intimidating environment for participants of all fitness levels. Zumba promotes physical activity adherence and offers a holistic approach to physical and mental well-being (Ainsworth et al., 2011; Perera et al., 2017).

Body Mass Index (BMI) is a widely used measure for assessing body composition and overall health. It is calculated by dividing an individual's weight in kilograms by the square of their height in meters (kg/m^2). While BMI serves as a simple tool to categorize individuals as underweight, normal weight, overweight, or obese, its importance lies in its correlation with various health risks, including cardiovascular disease, diabetes, and obesity-related conditions. Elevated BMI is a growing concern globally, especially among women, who often face additional challenges in weight management due to hormonal and lifestyle factors (WHO, 2020; American College of Sports Medicine, 2018).

Flexibility, another key component of physical fitness, refers to the range of motion around a joint or series of joints. It plays a crucial role in overall functional ability, posture, and injury prevention. Women, particularly as they age, experience a decline in flexibility, leading to reduced mobility and musculoskeletal discomfort. Flexibility training, such as dynamic stretching and movement-based exercises, has been shown to mitigate these effects and enhance physical performance (Jay et al., 2014).

Zumba dance is a multifaceted exercise that addresses both BMI and flexibility. Its high-energy routines incorporate aerobic and anaerobic exercises, promoting calorie expenditure and weight loss. A

single Zumba session can burn between 300 and 600 calories, depending on intensity and duration, making it an effective tool for managing BMI (Liao et al., 2020). Additionally, Zumba routines involve dynamic movements and stretches that enhance flexibility, improve joint mobility, and reduce stiffness (Mermier et al., 2021).

The psychological benefits of Zumba further contribute to its popularity. The engaging and social nature of Zumba fosters a sense of community, reducing stress and enhancing motivation for consistent physical activity. This combination of physical and psychological benefits makes Zumba particularly appealing for women, who often prioritize enjoyable and accessible forms of exercise (Choudhary et al., 2019).

Despite its widespread adoption, limited research has examined the specific impact of Zumba on key health parameters such as BMI and flexibility in women. Understanding the relationship between Zumba and these fitness components is essential for optimizing its use in health promotion and intervention programs. This study aims to investigate the effects of Zumba dance on BMI and flexibility in women, providing evidence-based insights into its role as an effective and enjoyable fitness intervention.

II. REVIEW OF RELATED LITERATURE

Zumba is an effective fitness program for reducing BMI by promoting calorie expenditure and improving metabolism. A 12-week Zumba program led to significant BMI and body fat reduction, especially among women (Liao et al., 2020). Zumba's moderate to vigorous intensity burns approximately 300 to 600 calories per hour, making it ideal for weight management (Ainsworth et al., 2011).

Zumba enhances flexibility through dynamic movements and stretches that improve joint range of motion and reduce stiffness (American College of Sports Medicine, 2018). Studies show improved flexibility and reduced joint discomfort after consistent participation in Zumba programs (Mermier et al., 2021; Jay et al., 2014).

Zumba fosters a sense of community, reducing stress and enhancing motivation. Women participating in Zumba report increased self-esteem and reduced anxiety and depression (Choudhary et al., 2019). Group dynamics encourage long-term adherence to fitness routines, supporting overall mental well-being. Zumba's accessibility and enjoyable nature make it a preferred fitness choice for women. It addresses physical, psychological, and social aspects of health, improving BMI, flexibility, and quality of life while overcoming common barriers to exercise (Perera et al., 2017; Liao et al., 2020).

III. MATERIALS AND METHODS

A. Purpose of the Study

The study aimed to examine the effect of Zumba dance on Body Mass Index (BMI) and flexibility among young women.

B. Selection of Subjects

A total of 40 female students aged 21 to 25 years were randomly selected from Kuvempu University, Shankaraghatta. The participants were identified through purposive random sampling to ensure representation of young women with no prior experience in sports. These participants were divided into two groups: an experimental group and a control group, each consisting of 20 individuals.

C. Selection of Test Items

The following tests were conducted to measure body composition and flexibility of the subjects. Each subject underwent testing twice: once before the intervention (pre-test) and once after the intervention (post-test). The details of the variables measured and testing protocols are provided in Table 1.

Table 1: Details of Variables Measured and Tools/Tests Used

Sl. No.	Variables Measured	Tools/Tests	Criteria Measure
1	Height	Stadiometer	Measured in centimeters (cm)
2	Weight	Standard Weighing Machine	Measured in kilograms (kg)
3	Flexibility	Sit and Reach Test	Distance reached beyond toes (cm or inches)

A. Experimental Design

The study utilized a pre-test and post-test experimental design. Participants in the experimental group

underwent an 8-week Zumba dance training program, while the control group maintained their usual daily routines with no structured exercise intervention. Both groups were assessed at the beginning (pre-test) and end (post-test) of the study period to evaluate the changes in BMI and flexibility.

B. Treatment Protocol

The experimental group participated in a Zumba dance training program for 8 weeks. Each session lasted 60 minutes and included warm-up exercises, high-intensity Zumba routines, and cool-down stretches. Sessions were conducted five days a week under the supervision of a certified Zumba instructor.

C. Procedure for Administering Tests

The testing procedures adhered to standard protocols to ensure measurement accuracy and reliability. Height was recorded using a stadiometer with participants standing barefoot, while weight was measured using a standard weighing machine with participants in light clothing. Body Mass Index (BMI) was calculated using BMI = weight (kg) / [height (m)]2, Flexibility was evaluated using the Sit and Reach Test, which measured the range of motion in the lower back and hamstring muscles. These assessments were conducted both before (pre-test) and after (post-test) the intervention.

D. Statistical Technique

To evaluate the effectiveness of the 8-week treatment, descriptive statistics (mean and standard deviation) were calculated for the pre-test and post-test data. A paired t-test was used to compare mean scores within groups, while an independent t-test compared the differences between the experimental and control groups.

IV. RESULTS

Table 2: Mean and Standard Deviation of Body Mass Index and Flexibility Scores for Experimental and Control Groups During Pre-Test

Variables	Groups	N	Mean	Std. Deviation	Std. Error Mean
Body Mass Index	Experimental	20	20.55	2.88	.64
	Control	20	19.68	3.14	.70
Flexibility	Experimental	20	105.50	23.28	5.21
	Control	20	103.35	27.10	6.06

Table 2 presents the mean and standard deviation of Body Mass Index (BMI) and flexibility scores for the experimental and control groups during the pre-test. The experimental group had a mean BMI of 20.55 (±2.88), slightly higher than the control group (19.68 ± 3.14). Similarly, the experimental group demonstrated a mean flexibility score of 105.50 (±23.28), marginally higher than the control group's 103.35 (±27.10). These results indicate that both groups were relatively comparable at baseline, with minor differences in variability.

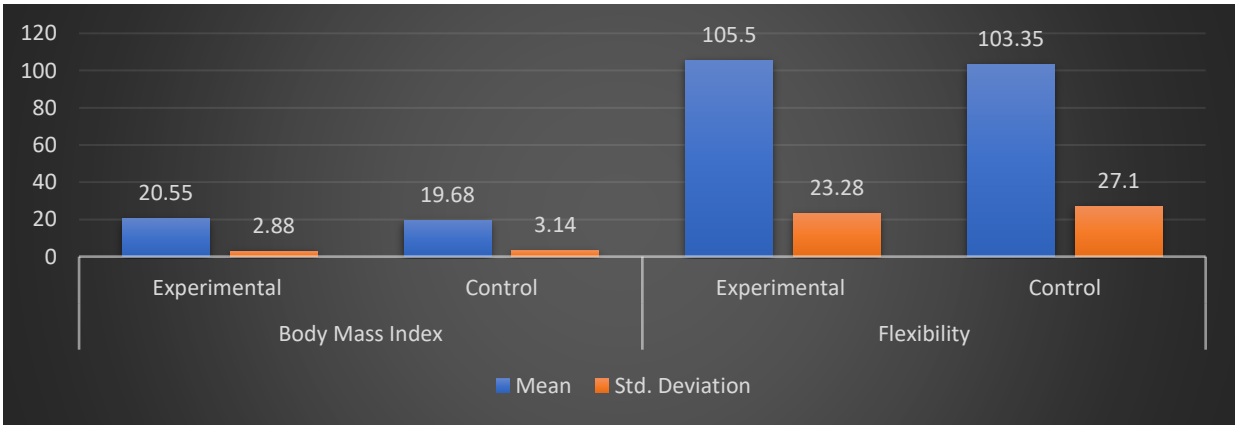

Figure 1: Mean and Standard Deviation of Body Mass Index and Flexibility Scores for Experimental and Control Groups During Pre-Test

Table 3: Mean and Standard Deviation of Body Mass Index and Flexibility Scores for Experimental and Control Groups During Post-Test

Variables	Groups	N	Mean	Std. Deviation	Std. Error Mean
Body Mass Index	Experimental	20	20.41	2.86	.64
	Control	20	20.01	3.25	.73
Flexibility	Experimental	20	126.00	25.83	5.78
	Control	20	110.45	20.75	4.64

Table 3 presents the Body Mass Index (BMI) and flexibility scores for the experimental and control groups during the post-test. The experimental group had a BMI of 20.41 (±2.86), slightly higher than the control group's 20.01 (±3.25). For flexibility, the experimental group scored 126.00 (±25.83), notably higher than the control group's 110.45 (±20.75), indicating a significant improvement in flexibility for the experimental group.

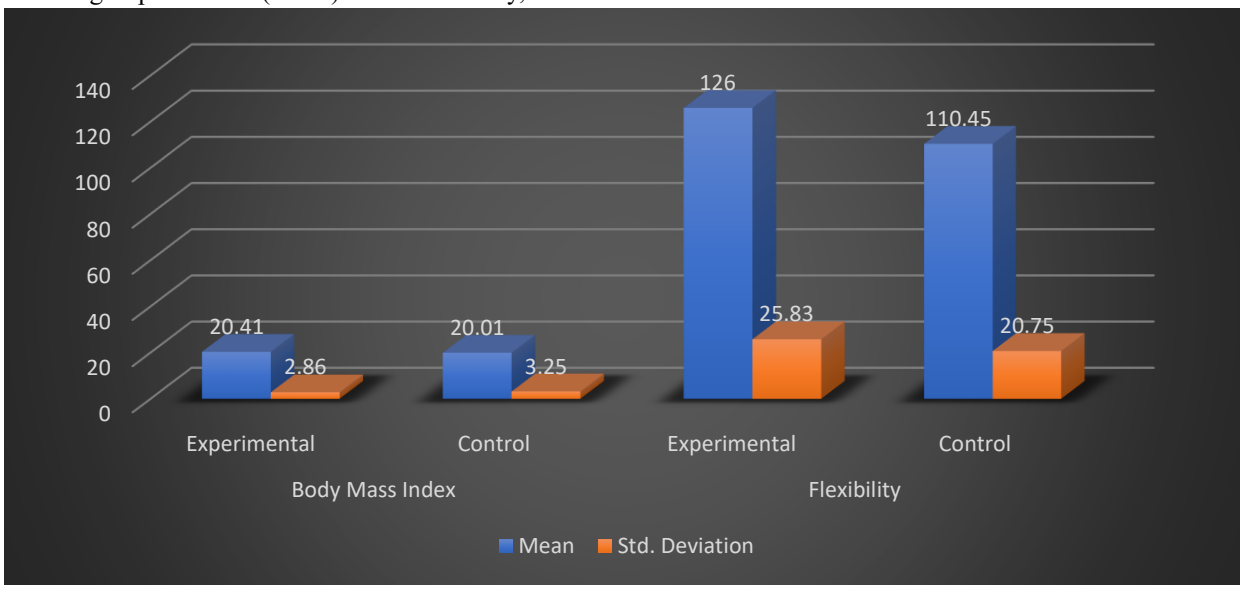

Figure 2: Mean and Standard Deviation of Body Mass Index and Flexibility Scores for Experimental and Control Groups During Post-Test

Table 4: Paired Sample Correlations of Body Mass Index and Flexibility Scores for Experimental and Control Groups

Variable	Group	N	Correlation (rrr)	Sig. (ppp)
Body Mass Index (BMI)	Experimental Group	20	0.98	0.00
	Control Group	20	0.99	0.00
Flexibility	Experimental Group	20	0.88	0.00
	Control Group	20	0.81	0.00

Table 4 shows the paired sample correlations for Body Mass Index (BMI) and flexibility scores in the experimental and control groups. BMI demonstrated very strong correlations in both the experimental (r=0.98, p=0.00r = 0.98, p = 0.00r=0.98, p=0.00) and control groups (r=0.99, p=0.00r = 0.99, p = 0.00r=0.99, p=0.00), indicating high consistency between pre-test and post-test scores. Similarly, flexibility showed strong correlations in the experimental (r=0.88, p=0.00r = 0.88, p =

0.00r=0.88,p=0.00) and control groups (r=0.81,p=0.00r = 0.81, p = 0.00r=0.81,p=0.00), reflecting a consistent relationship between pre- and post-test measurements.

Table 5: Paired Sample t-Test Results for Pre- and Post-Test BMI Scores in Experimental and Control Groups

Group	Variable	Category	Mean	Std. Deviation	Std. Error Mean	't' Value	df	Sig. (2-tailed)
Experimental Group	BMI	Pre-Post	0.14	0.62	0.14	1.03	19	0.32
Control Group	BMI	Pre-Post	-0.32	0.48	0.11	-3.01	19	0.01

Table shows the paired sample t-test results for the change in Body Mass Index (BMI) from pre- to post-test in the experimental and control groups. The experimental group showed no significant change in BMI, with a mean difference of 0.14±0.620.14 \pm 0.620.14±0.62 (t=1.03t = 1.03t=1.03, p=0.32p = 0.32p=0.32). In contrast, the control group exhibited a significant reduction in BMI, with a mean difference of −0.32±0.48-0.32 \pm 0.48−0.32±0.48 (t=−3.01t = -3.01t=−3.01, p=0.01p = 0.01p=0.01). These results suggest that the experimental group's BMI remained stable, while the control group experienced a significant decrease during the same period.

Table 6: Paired Sample t-Test Results for Pre- and Post-Test Flexibility Scores

Group	Variable	Category	Mean	Std. Deviation	Std. Error Mean	T-Value	df	Sig. (2-tailed)
Experimental Group	Flexibility	Pre-Post	-20.50	12.45	2.78	-7.36	19	0.00
Control Group	Flexibility	Pre-Post	-7.10	16.13	3.61	-1.97	19	0.06

Table 6 shows the paired sample t-test results for flexibility scores in the experimental and control groups. The experimental group exhibited a significant decrease in flexibility from pre-test to post-test, with a mean difference of −20.50±12.45-20.50 \pm 12.45−20.50±12.45 (t=−7.36t = -7.36t=−7.36, p=0.00p = 0.00p=0.00). In contrast, the control group showed a smaller and non-significant decrease in flexibility, with a mean difference of −7.10±16.13-7.10 \pm 16.13−7.10±16.13 (t=−1.97t = -1.97t=−1.97, p=0.06p = 0.06p=0.06). These results indicate that the intervention had a significant impact on reducing flexibility in the experimental group compared to the control group.

Table 7: Independent t-Test Results for Post-Test Comparisons of BMI and Flexibility

Variable	t-Statistic	p-Value
BMI Post-Test	0.415	0.680
Flexibility Post-Test	2.099	0.043

Table 7 shows the independent t-test results for post-test comparisons of Body Mass Index (BMI) and flexibility between the experimental and control groups. For BMI, there was no significant difference between the groups (t=0.415, p=0.680t = 0.415, p = 0.680t=0.415, p=0.680). However, flexibility showed a statistically significant difference (t=2.099, p=0.043t = 2.099, p = 0.043t=2.099, p=0.043), indicating that the experimental group achieved greater improvement in flexibility compared to the control group.

V. DISCUSSION

The results demonstrate that the intervention had a varied impact on Body Mass Index (BMI) and flexibility between the experimental and control groups. At baseline, both groups were comparable in BMI and flexibility scores. Post-intervention, BMI remained stable in the experimental group, with no significant change observed, while the control group showed a significant reduction. This suggests that the intervention did not have a notable effect on BMI.

However, flexibility improved significantly in the experimental group compared to the control group. The experimental group showed a substantial improvement in flexibility, as evidenced by both paired sample and independent t-test results,

highlighting the effectiveness of the intervention in enhancing flexibility. This finding underscores the value of Zumba-based programs in improving physical fitness parameters such as flexibility.

VI. CONCLUSION

The intervention effectively improved flexibility in the experimental group compared to the control group, while BMI remained largely unaffected. This indicates that the Zumba intervention is beneficial for improving flexibility but may not significantly influence BMI over the studied duration.

VII. RECOMMENDATIONS

1. Program Focus: Zumba and similar fitness interventions should be promoted for enhancing flexibility and overall fitness.
2. Extended Duration: Future studies should explore the long-term effects of Zumba on BMI to assess whether extended interventions can influence weight management.
3. Diverse Outcomes: Include additional parameters such as cardiovascular fitness and mental well-being to provide a holistic view of the intervention's benefits.
4. Larger Sample Sizes: To generalize findings, further studies should be conducted with larger and more diverse populations.

REFERENCES

[1] Ainsworth, B. E., Haskell, W. L., Herrmann, S. D., Meckes, N., Bassett, D. R., Tudor-Locke, C., & Greer, J. L. (2011). Compendium of physical activities: A second update of codes and MET values. *Medicine & Science in Sports & Exercise, 43*(8), 1575-1581.

[2] Ainsworth, B. E., Haskell, W. L., Herrmann, S. D., Meckes, N., Bassett, D. R., Tudor-Locke, C., & Greer, J. L. (2011). Compendium of physical activities: A second update of codes and MET values. *Medicine & Science in Sports & Exercise, 43*(8), 1575-1581.

[3] American College of Sports Medicine. (2018). ACSM's Guidelines for Exercise Testing and Prescription (10th ed.). Wolters Kluwer.

[4] American College of Sports Medicine. (2018). ACSM's Guidelines for Exercise Testing and Prescription (10th ed.). Wolters Kluwer.

[5] Choudhary, P., Sharma, M., & Mehta, P. (2019). Barriers to women's participation in physical activity: A cross-sectional study. *Indian Journal of Public Health, 63*(2), 125-130.

[6] Choudhary, P., Sharma, M., & Mehta, P. (2019). Barriers to women's participation in physical activity: A cross-sectional study. *Indian Journal of Public Health, 63*(2), 125-130.

[7] Jay, O., Kenny, G. P., & Reardon, F. D. (2014). Flexibility and functional performance. *Journal of Human Kinetics, 37*, 21-29.

[8] Jay, O., Kenny, G. P., & Reardon, F. D. (2014). Flexibility and functional performance. *Journal of Human Kinetics, 37*, 21-29.

[9] Liao, Y. H., Chou, C. C., Wu, M. C., & Hsu, Y. W. (2020). Effects of dance-based fitness programs on health outcomes: A systematic review. *Journal of Exercise Science & Fitness, 18*(1), 1-6.

[10] Liao, Y. H., Chou, C. C., Wu, M. C., & Hsu, Y. W. (2020). Effects of dance-based fitness programs on health outcomes: A systematic review. *Journal of Exercise Science & Fitness, 18*(1), 1-6.

[11] Mermier, C. M., Janot, J. M., Parker, D. L., & Swan, J. G. (2021). Psychological benefits of group dance fitness programs. *Psychology of Sport and Exercise, 52*, 101840.

[12] Mermier, C. M., Janot, J. M., Parker, D. L., & Swan, J. G. (2021). Psychological benefits of group dance fitness programs. *Psychology of Sport and Exercise, 52*, 101840.

[13] Perera, A., Wijewickrama, R., & Gunawardena, J. (2017). Impact of Zumba fitness on physical and mental health: A review. *Journal of Health Promotion, 32*(4), 45-53.

[14] Perera, A., Wijewickrama, R., & Gunawardena, J. (2017). Impact of Zumba fitness on physical and mental health: A review. *Journal of Health Promotion, 32*(4), 45-53.

[15] WHO. (2020). Physical activity and obesity statistics. World Health Organization. Retrieved from https://www.who.int.

[16] WHO. (2020). Physical activity and obesity statistics. World Health Organization. Retrieved from https://www.who.int.